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**Surface-attached orthogonal gradient hydrogels** PANDIYARAJAN CHINNAYAN KANNAN, JAN GENZER, NC State University — Gradient materials play a significant role in the creation of artificial implants due to their potential to reduce stress concentration when two or more structures with different mechanical properties are joined together, *e.g.*, tendon, a fibrous protein that connects the soft and hard muscle tissues in our body. We employ free radical polymerization to synthesize random copolymers containing 90% of N-isopropyl acrylamide (NIPAAm), 5% photo-active methacrylyloxybenzophenone (MABP) and 5% thermally-active styrenesulfonylazide (SSAz) crosslinkers. The presence of MABP and SSAz facilitates adjusting gel density on a flat support in two orthogonal directions by spatially and independently controlling UV dosage and temperature. The swelling behavior ($\alpha$) of the gels in water and methanol is examined using a spectroscopic ellipsometry and the degree of swelling depends on the extent of crosslinking that ranges from $\alpha$ = 1-1.2 (highly crosslinked gels) to $\alpha$ = 4-5 (loosely crosslinked gels). We compare the network properties surface-attached gels and un-attached identical counterparts and confirm that the linear swelling ratio of surface-attached networks is higher than that of the corresponding un-attached gels.

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